Claims

1. A process for manufacturing a 3-layer catalyst-coated polymer electrolyte membrane with catalyst layers on the front and on the back side of the membrane coated by use of catalyst-containing inks,
wherein the polymer electrolyte membrane is connected with at least one supporting foil during at least all coating steps.

2. The process according to claim 1,
wherein the process is conducted continuously and the polymer electrolyte membrane as well as at least one supporting foil are provided in tape form.

3. The process according to claim 1,
wherein a second supporting foil is applied to the front side of the polymer electrolyte membrane after the first coating step of the front side,
the first supporting foil is removed from the back side of the polymer electrolyte membrane and subsequently the coating of the back side of the polymer electrolyte membrane is conducted.

4. The process according to claim 1,
wherein at least one supporting foil is fixed to the edge area of the catalyst-coated polymer electrolyte membrane by a lamination process.

5. The process according to claim 1,
wherein at least one supporting foil is perforated.

6. The process according to claim 1,
wherein the polymer electrolyte membrane comprises of polymeric, perfluorinated sulphonic acid compositions, doped polybenzimidazoles, polyetherketones and polysulphones or other proton-conducting materials. and has a thickness from 10 μm to 200 μm.

7. The process according to claim 1, wherein the polymer electrolyte membrane has a thickness in the range of 10 to 200 μm.

8. The process according to claim 1,
wherein the at least one supporting foil comprises of polyester, polyethylene,

polypropylene, polycarbonate, polytetrafluoroethylene, polyurethane, polyamide, polyimide, paper or other comparable materials

9. The process according to claim 1,
wherein the at least one supporting foil has a thickness in the range of of 10 to 250 μm.

10. The process according to claim 1,
wherein screen printing, stencil printing, offset printing, transfer printing, doctor-blading or spraying is used as coating method.

11. The process according to claim 1, comprising the steps
(a) coating the front side of a supported polymer electrolyte membrane having a first supporting foil on its back side with a catalyst layer and drying,
(b) applying a second supporting foil to the front side of the polymer electrolyte membrane,
(c) removing the first supporting foil from the backside of the polymer electrolyte membrane,
(d) coating the back side of the polymer electrolyte membrane with a catalyst layer and drying.

12. The process according to claim 11, further comprising
applying a first supporting foil to the back side of an unsupported polymer electrolyte membrane.

13. The process according to claim 11, further comprising
removing the second supporting foil after the coating the back side of the polymer electrolyte membrane.

14. The process according to claim 11, further comprising
applying an adhesive component between supporting foil and polymer electrolyte membrane.

15. The process according to claim 11, further comprising
post-treating the coated polymer electrolyte membrane in water at temperatures in the range of 20 to 95°C.

16. The process according to claim 11,
wherein the drying of the catalyst layer is performed by means of hot air, infrared, microwave, plasma or combinations thereof.

17. The process according to claim 11,
wherein the drying temperature is in the range of 20 to 150°C and the drying period is in the range of 1 to 30 minutes.

18. A 3-layer catalyst-coated polymer electrolyte membrane coated with a catalyst layer on the front and the back side, manufactured according to the process of claim 1.

19. Use of the catalyst-coated polymer electrolyte membrane manufactured according to the process of claim 1 in membrane-electrode-assemblies (MEAs) for electro-chemical devices such as PEM fuel cells, direct methanol fuel cells (DMFC), electrochemical sensors or electrolyzers.

20. Apparatus for manufacture of 3-layer catalyst-coated polymer electrode membranes by use of catalyst-containing inks according to the process of any one of claims 1 to 17, comprising
means for supporting the polymer electrolyte membrane with at least one supporting foil during all processing steps.